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EPA Superfund
Record of Decision:

PORTLAND CEMENT (KILN DUST 2 & 3)
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Text:

RECORD OF DECISION

PORTLAND CEMENT CO. (KILN DUST #2 & #3)
Operable Unit No. 2
Salt Lake City, Utah

March 31, 1992

Prepared by:

U.S. Environmental Protection Agency
Region VIII

DECLARATION FOR THE RECORD OF DECISION

PORTLAND CEMENT CO. (Kiln Dust #2 & #3)
Operable Unit No. 2
Salt Lake City, Utah

March 31, 1992

U.S. Environmental Protection Agency
Region VIII

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Portland Cement Co. (Kiln Dust #2 & #3) Superfund Site
Operable Unit No. 2 (OU2)
Salt Lake City, Utah

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for Operable Unit No. 2 (OU2) at the Portland Cement Co. Superfund Site (Site) in Salt Lake City, Utah. The selected remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments Reauthorization Act (SARA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record for the Site. The State of Utah concurs with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The Site is currently divided into two operable units (OUs). The OU1 ROD was signed on July 19, 1990. It requires excavation of the waste cement kiln dust (waste CKD) as well as the separation of chromium-bearing refractory bricks (chrome-bearing bricks) from the waste CKD and their temporary storage on site. The OU1 ROD also requires the initiation of groundwater monitoring.

The second OU (OU2) is the subject of this ROD. OU2 addresses the risk of exposure to soils with elevated pH (high alkalinity) and lead levels. The soils are also a potential secondary source of groundwater contamination. Additionally, OU2 addresses the final disposal of the chromebearing bricks.

After the removal of the potential sources of groundwater contamination under OU1 and OU2, the groundwater contamination will be addressed. EPA will address remediation of the groundwater, if necessary, under the five-year review of OU1 or as a third OU.

The selected remedy for OU2 is On-Site Treatment and Off-Site Disposal. Under this alternative:

- Contaminated soil above 500 mg/kg lead or 70 mg/kg arsenic shall be excavated;

- Soil equal to or above 5 mg/L, as measured by TCLP analysis, shall be identified and treated by solidification; during the RI/FFS, it was determined that soil above 500 mg/kg lead will likely be above 5 mg/L lead as measured by TCLP analysis;

- The chrome-bearing bricks shall be treated on site by a process of chemical fixation followed by solidification;

- The treated bricks and soil shall be transported and disposed off site; and

- A protective layer of clean fill at least 18 inches thick shall be installed on the Site.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility or volume as a principal element.

Because the selected remedy will leave highly alkaline soils on site, a review will be conducted five years after commencement of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

DECISION SUMMARY FOR THE RECORD OF DECISION

Portland Cement Co. (Kiln Dust #2 & #3)
Operable Unit No. 2
Salt Lake City, Utah

March 31, 1992

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Decision Summary for the Record of Decision

I. Site Name, Location, and Description

Site History

The Portland Cement Co. (Kiln Dust #2 and #3) Superfund Site (Site) is located in Salt Lake City, Utah, on the west side of Redwood Road (1700 West) at 1000 South, within a triangular area defined by Indiana Avenue, Redwood Road and the Jordan River Surplus Canal (Figure 1). The Site consists of three separate but adjacent properties known as Site 2, Site 3 and the West Site (Figure 2). The West Site and Sites 2 and 3 cover approximately 35, 17 and 19 acres, respectively. The area surrounding to the Site is primarily industrial and borders low density residential and vacant or agricultural land. The immediate area surrounding the Site is highly commercialized and industrialized. Residential areas exist primarily east of the Site and include single-family dwellings, mobile home parks and some high density multi-family residential units. There are no buildings on the Site. However, two underground structures, a large sewer pipe with above-ground manholes and a natural gas pipeline, traverse the Site. A chain-link fence was constructed around the Site in 1989 to prevent unauthorized entry.

Between 1965 and 1983, waste cement kiln dust (waste CKD) generated at the Portland Cement Company plant in Salt Lake City was deposited on the Site, resulting in soil, surface water and groundwater contamination. For purposes of conducting remedial efforts, the Site has been divided into two operable units: Operable Unit 1 (OU1), which addresses on the waste CKD deposited on the Site, and Operable Unit 2 (OU2), which is defined as the on-site soils and other materials potentially contaminated by the waste CKD, specifically the chromium-bearing refractory kiln (chrome-bearing) bricks that were disposed of with the waste CKD.

Site Geology and Hydrology

The Site is located in the Salt Lake Valley which occupies approximately 400 square miles in north-central Utah. The Salt Lake Valley lies on the eastern portion of the Basin and Range physiographic province. The boundaries of the Salt Lake Valley are formed by the Great Salt Lake on the north and by mountain ranges to the east, west and south.

In general, the Salt Lake Valley is filled with alluvial and fluvial detritus derived from the surrounding mountains through an ongoing process of erosion and deposition. The Site is underlain by several thousand feet of unconsolidated sediments including lake-bottom clays interbedded with thin discontinuous sand lenses. The coarser grained sediments form aquifers which are used as a source of irrigation and drinking water in the Salt Lake Valley.

Topography

The topography at the Site is relatively flat with elevations varying slightly above and below 4225 feet above mean sea level. The waste CKD addressed by OU1 is present in piles over much of the Site, creating an uneven ground surface; it will be removed during implementation of the OU1 remedy. Early surveys show that before fill was placed at the Site, a grade break existed in the ground surface which bisected the triangular-shaped area along a northwest-southeast axis. Land to the northeast of this break was relatively high ground and was used for agricultural and residential purposes. Land southwest of the break was comprised of low-lying salt flats. The apparent purpose of placing the waste CKD on the Site was to raise the ground surface elevation, enabling development of this area.

Drainage

Drainage on the Site is poor. Occasionally water collects in confined depressions east and south of Site 2, between Sites 2 and 3 and north of Site 3. The Surplus Canal, which flows along the southern boundary of the Site, carries excess flow in a northwesterly direction from the Jordan River to the Great Salt Lake. The City Drain, part of the urban storm sewer system, bisects the Site, separating Site 3 from Site 2 and the West Site. A shallow drainage which carries surface runoff into City Drain has been excavated along the west boundary of the Link Trucking property, which is situated between Sites 2 and 3.

Groundwater

Groundwater under the Site occurs in three divisions: (1) a shallow groundwater body overlying confining layers, (2) local perched water bodies, and (3) an artesian basin. In general, the aquifers are separated by a confining bed consisting of a relatively impermeable interbedded series of clay, silt and fine sand ranging in thickness from 40 to 100 feet.

The shallow unconfined aquifer is largely comprised of clay, silt and fine sand deposits. It is recharged by infiltration from precipitation, canals, irrigation, and surface water. Additionally, groundwater in the deeper aquifer typically moves upward into the shallow aquifer and is a source of recharge for the shallow aquifer. The shallow or unconfined groundwater in the area of the Site has been classified as Class II and Class III groundwater by the Utah Department of Environmental Quality.

The deep confined aquifer is composed of clay, silt, sand and gravel, all hydrologically connected, with individual beds ranging from less than one foot to more than 50 feet thick. The maximum thickness for the deep aquifer is approximately 1000 feet in the northern portion of the Salt Lake Valley near the Site. Water in the deep aquifer is under artesian pressure withupward flow gradients, resulting in some recharge to the shallow unconfined aquifer. The artesian aquifer, which flows to the north-northwest toward the Great Salt Lake, serves as the primary source of groundwater in the Salt Lake Valley. It is used for stock watering, irrigation and industrial supply and public drinking consumption.

Seven municipal wells are present at distances from one to three miles from the Site. There are 67 low yield private wells within one mile of the Site.

Vegetation

Most of the area near the Site consisted of saltgrass alkali flats prior to industrial development. Currently, the Site is mostly barren of vegetation. However, there is still suitable habitat for numerous animal species on the West Site and on the Site perimeter. The State of Utah (State) has classified the Surplus Canal as Class 3C, 3D and 4, which are protective of nongame fish and other aquatic organisms; waterfowl, shorebirds and other wateroriented wildlife; and for agricultural uses such as irrigation of crops and stock watering. According to previous investigations, no listed or candidate threatened or endangered species are known to occur in the vicinity of the Site.

II. Site History and Enforcement Activities

All waste CKD deposited at the Site was produced between 1959 and 1983 by the Portland Cement plant located at 619 West 700 South in Salt Lake City, Utah. The plant was owned and operated by Portland Cement Company of Utah (PCU) until September 1979, when Lone Star Industries (Lone Star) purchased the stock of PCU. At the time of purchase, the name of the company was changed to Utah Portland Quarries, Inc. Although the waste CKD was placed on the Site by PCU and Lone Star, neither company owns the land comprising the Site.

Dry waste CKD was reportedly placed on the West Site from 1965until 1974. Disposal of dry waste CKD in the area of Site 3 occurred from 1974 until 1978. At Site 2, waste CKD was disposed as a dry material between 1978 and 1980 and as a wet slurry between 1980 and 1983.

In response to complaints from area residents who were concerned about windblown waste CKD, the U.S. Environmental Protection Agency (EPA) initiated a Preliminary Assessment, which indicated the potential for risk to the community. In April 1984, Lone Star voluntarily began environmental investigations at the Site which included the installation of groundwater monitoring wells to determine if groundwater contamination was present. In September 1984, Sites 2 and 3 were proposed for inclusion on the National Priorities List (NPL). In 1985, the investigation was organized and expanded as a Remedial Investigation/Feasibility Study (RI/FS) under a Consent Decree issued by the State. The Site was formally listed on the NPL on June 10, 1986. The West Site was added to the Superfund Site at this time. On September 17, 1990, the EPA sent a Special Notice Letter, which advised Potentially Responsible Parties (PRPs) of their potential liability. The letters were sent to Lone Star Industries and the Site landowners, Williamsen Investment Co., Lawrence D. Williamsen, Sidney M. and Veoma H. Horman, Horman Family Trust, Calvin B. Brown and Southwest Investment, Inc. as identified PRPs.

On July 19, 1990, a Record of Decision (ROD) was issued for Operable Unit No. 1 (OU1) of the Site. The selected remedy described in the ROD addressed the principal source of contamination at the Site through excavation and off -site disposal of the waste CKD. About 360 tons of chrome-bearing bricks which were disposed with waste CKD are to be separated from the waste CKD, temporarily stored at the Site and managed as part of the OU2 remedial action. In addition, groundwater monitoring for the Site will be initiated. Negotiations with the PRPs regarding the conductance of the remedy ended unsuccessfully. The State recently assumed the Superfund-financed lead of OU1 Remedial Design from the EPA. Currently, the State is in the process of selecting a consultant to conduct the OU1 remedial design work.

Environmental investigations focusing on OU2 have been conducted by the Utah Department of Environmental Quality (UDEQ) and the EPA. In October 1991, a Baseline Risk Assessment (BRA) which evaluated potential chemical exposure and the risks associated with contaminated soil and bricks was completed. It was followed in November 1991 by a Remedial Investigation (RI) Report and Focused Feasibility Study (FFS). Upon finalization and approval of this ROD, the selected remedy will be implemented.

III. Highlights of Community Participation

Although the community has played a role in Site activities since 1983, when the EPA responded to complaints by area business owners who were concerned about airborne waste CKD being blown into their offices, community participation for OU2 became most active in late 1991. Soon after the completion of the OU2 RI and FFS, Salt Lake City representatives and Salt Lake County Commissioners were briefed on the reports' findings and the Preferred Alternative. Copies of the Proposed Plan were mailed to area residents and others on the mailing list on November 8, 1991. The notice of availability for these reports and the announcement of the Preferred Alternative were published in the Salt Lake Tribune and Deseret News on November 10, 1991. News coverage of the release of the Proposed Plan was also provided by other major media in the Salt Lake City market, notifying the public of a scheduled public meeting and the public comment period. The Preferred Alternative presented in the Proposed Plan consisted of on-site treatment and on-site disposal of contaminated soil and chrome-bearing bricks.

A public meeting to receive comments on the Proposed Plan was held November 20, 1991 and was attended by approximately 50 people, including concerned citizens, elected officials, State and EPA officials and legal representatives of Lone Star and some Site landowners. A transcript of this meeting is available for public review at UDEQ, the Chapman Branch of the Salt Lake City Public Library, and the EPA offices in Denver, Colorado. Media coverage of the public meeting included broadcasts that night and written news reports the following day.

The 30-day public comment period, which was initially scheduled for November 12 to December 13, 1991, was extended another 30 days in response to public interest. This extension was advertised in the Salt Lake Tribune and the Deseret News on December 8, 1991. The comments received and responses to these comments are summarized in the Responsiveness Summary section of this ROD.

EPA and the State have continued to keep the community and local government officials informed regarding the status of the Site through ongoing community relations activities. Regular briefings have been held by the UDEQ Superfund representatives for Salt Lake City and Salt Lake City-County Health representatives to update them on Superfund sites within Salt Lake City, including the Site. During 1991, briefings were held in March and August. In addition, the UDEQ Community Relations staff maintained regular phone contact with the Salt Lake City Council representative from the Site area and with Salt Lake City-County Health Department Community Relations personnel.

IV. Scope and Role of Operable Units Within Site Strategy

For purposes of conducting remedial efforts, the Site has been divided into two operable units: OU1, the remedy of which focuses on the waste CKD deposited on the Site, and OU2, which is defined as the on-site soils and other materials potentially contaminated by the waste CKD, specifically chromebearing bricks that were disposed of with the waste CKD.

Groundwater contamination will be addressed as either a separateoperable unit (OU3) or under the 5-year review of the OU1 remedial action. Investigation of the groundwater began during the OU1 RI/FS. Groundwater monitoring will occur during the OU1 remedial action. The OU1 and OU2 remedies focus on source control and therefore do not include groundwater treatment. This approach was based on a number of factors, including: there is no present uses of the groundwater impacted by the Site; short-term potential use is minimal; the extent of groundwater contamination is limited; and remedies which remove the contamination sources are expected to accelerate improvement in the groundwater quality. If monitoring indicates that source removal does not provide adequate protection of human health and the environment, additional investigation and remediation will be initiated. The approach which most efficiently addresses the problem will determine whether groundwater contamination is addressed as a third OU or under the OU1 five-year review.

This ROD addresses OU2. The waste CKD addressed by OU1 is the primary source of contamination of on-site soil. For this reason, the waste CKD is being removed during the OU1 remedial action. However, the on-site contaminated soil and chrome-bearing bricks also provide a potential source of groundwater contamination on the Site; therefore, the remediation of these sources is addressed by this ROD.

The BRA determined that conditions at the Site after implementation of the OU1 remedy will pose a risk to human health and the environment. Specifically, the high alkalinity of the soil and the lead levels detected in the contaminated soil pose a risk through direct contact, ingestion, and inhalation. The selected remedy for OU2 reduces these principal threats as well as prevents further contamination of the groundwater. Risks associated with the chrome-bearing bricks that were excavated with the waste CKD during the OU1 remedial action are also addressed in OU2. V. Summary of Site Characteristics

Nature and Extent of Contamination

The waste CKD addressed by OU1 and the chrome-bearing bricks disposed with the waste CKD are a source of contamination of the underlying soil and groundwater. Additionally, the contaminated soils beneath the waste CKD are a potential source of groundwater contamination. Contaminants related to the waste CKD have been detected above background concentrations in shallow groundwater to a depth of about 25 feet both on the Site and immediately north of the Site. There are no known users of shallow groundwater in the immediate vicinity of the Site. There is no evidence that groundwater from the deeper artesian aquifer has been affected by waste CKD constituents on the Site.

Several potentially toxic metals in OU2 soils exceed local background levels: cadmium, chromium, chromium VI (hexavalent chromium), lead and molybdenum. In addition, the high alkalinity of the soil on Site is higher than the background, causing alkalinity to be a potential concern as well. Statistical analysis of on-site sampling results for soils indicates that an insufficient number of samples were analyzed to eliminate arsenic, a known human carcinogen, as a potential contaminant. Since the waste CKD was found to contain elevated levels of arsenic, it was suspected that the underlying soil would also contain elevated arsenic levels. Detected concentrations of chemicals of potential concern and pH are shown in Table V-1.

Samples of contaminated soil and chrome-bearing bricks were analyzed using the Toxicity Characteristic Leaching Procedure (TCLP). Detected concentrations in the contaminated soil exceeded the toxicity characteristic hazardous waste criterion for lead of 5 milligrams per liter (mg/L), and the soil has a hazardous waste code of D008. Chromium concentrations in the chrome-bearing bricks ranged between 1238 mg/L and 6977 mg/L, greater than the toxicity characteristic hazardous waste criterion for chromium of 5 mg/L. Once excavated, the chrome-bearing bricks have the hazardous waste code of D007. As a characteristic hazardous wastes, treatment is required prior to disposal in accordance with the Land Disposal Restrictions (LDRs) promulgated under the Resource Conservation and Recovery Act (RCRA). Comparison of the results of both total chromium and hexavalent chromium indicate that most or all of the chromium that can be leached is in the hexavalent state in these brick samples.

Soil situated between the base of the waste CKD and the top of the groundwater were investigated under OU2. The volume of this soil is approximately 488,000 cubic yards. Of this total volume, an estimated 27,400 cubic yards of soil exceed the health-based levels for lead, all of which are located on Site 2.

After implementation of the OU1 remedy, the chrome-bearing bricks will be located in a temporary storage area.

Contaminant Fate and Transport

Contaminants present in soil may potentially migrate into air, groundwater, or surface water. Soil contaminants may leach into groundwater as a result of infiltrating water or rising groundwater levels that contact contaminated soil. Suspended soil particles can also contribute to airborne contamination. Contaminants could also be transported, either in solution or sorbed to sediments, by surface water runoff or groundwater discharge. Soils may also act as the source of chemicals taken up by vegetation or by animals. All of these types of migration mechanisms have either been observed or could potentially occur at the Site.

The current risk of exposure to area residents is minimal since there are no nearby residences to the north (down-gradient) and northwest (downwind) of the Site.

VI. Summary of Site Risks

HUMAN HEALTH RISKS

As part of the RI/FFS, 23 soil samples from seven on-site locations were collected at a variety of depths and were analyzed for 14 metals as well as pH, conductivity and alkalinity. Based on a statistical comparison (ttest) of contaminant concentrations in Site soils to those found in background soils, the BRA identified six chemicals of potential concern at the Site: arsenic, cadmium, total chromium, hexavalent chromium, lead, and molybdenum. Also identified as potential health concerns at the Site were highly alkaline soils and chrome-bearing refractory bricks. Each of these potential health concerns was evaluated under a hypothetical exposure scenario consisting of future residential use of the Site. Current land uses were not considered to represent potential contaminant exposure because the Site is presently not used and is fenced to prevent trespassing.

Exposure Pathways

Several potential exposure pathways were evaluated within the residential exposure scenario. These consisted of:

- Dermal contact;

- Incidental soil ingestion;

- Ingestion of indoor dust;

- Inhalation of airborne dust following implementation of OU1 remedy; and

- Ingestion of homegrown produce.

The pathways resulting in the largest amount of exposure to contaminants are ingestion of dust and ingestion of produce. Of the chemicals evaluated, exposures to molybdenum are the greatest. However, this exposure does not correspond to the greatest risk to human health due to molybdenum's low toxicity relative to the other chemicals of concern. Groundwater was not evaluated as an exposure pathway since it will be addressed in the future. Exposure to surface water was not evaluated in the BRA as this pathway was considered incomplete. Risks associated with the chrome-bearing bricks and the waste CKD were quantified during the OU1 investigations. The OU2 BRA did not reevaluate the risk associated with the chrome-bearing bricks.

Exposure assumptions were developed in accordance with EPA guidance documents. These assumptions were based on a residential scenario and were time-weighted over a 30-year period for all pathways except ingestion of indoor dust, which was evaluated only for children up to 2 years of age. Two year old children exhibit pica (soil eating) behavior and are susceptible to the adverse effects from contaminant exposure. Specific exposure assumptions for each pathway are presented in Table VI-1. Due to the lack of an established threshold exposure level for lead, exposures to lead were evaluated using the U.S. EPA Integrated Uptake Biokinetic (IU/BK) model, which evaluates exposures to the following media: air; diet;

drinking water; soil and indoor dust; paint; and maternal contribution during gestation. Three pathways were selected for site-specific quantitative evaluation: ingestion of soils and indoor dust, inhalation of airborne dust, and ingestion of produce. Default values provided by the IU/BK model were used for the remaining pathways. It was assumed that children at the Site would not be exposed to lead-contaminated paint and that fetal exposures would be comparable to the U.S. normal maternal lead level of 7.5 micrograms per deciliter (ug/dL). Additional assumptions of the IU/BK model are that gastrointestinal absorption of lead is 50 percent, that 2-year old children have an inhalation rate of 5 m^3/day, and that the lungs absorb 32 percent of inhaled lead. Lead exposures that are predicted by the IU/BK model are then compared with an acceptable blood level, currently set at 10 ug/dL.

A summary of analytical results and exposure point concentrations for contaminants in soil, air and produce are presented in Tables V-1, VI-2, and VI-3, respectively. Exposure point concentrations for contaminants in soil are based on the 23 soil samples collected, which included samples collected at the surface and at depths of up to 3.92 feet below the surface. A 95percentile upper confidence limit was calculated on the arithmetic mean and used as the exposure point concentration.

Contaminant concentrations in dust were assumed to be equal to those found in soil. Contaminant concentrations in air were estimated using several models which used contaminant concentrations in the upper six inches of soil as well as site-specific meteorological data. Contaminant concentrations in produce were estimated assuming airborne deposition of contaminants onto plants and uptake of contaminants from soil by roots.

Toxicity Assessment

Cancer potency factors (CPFs) have been developed by the EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. CPFs are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Reference doses (RfDs) have been developed by the EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting non-carcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse non-carcinogenic effects to occur.

Tables VI-4 and VI-5 summarize the toxicity values used in the BRA for non-carcinogenic and carcinogenic effects of the chemicals of concern, respectively. Exposure to arsenic, cadmium, Chromium VI and lead can result in carcinogenic effects as well as non-carcinogenic effects. Chromium III and molybdenum are not considered carcinogens. Confidence levels in the toxicity value, uncertainty and modifying factors and the critical effects for each chemical are also presented. Toxicity data were obtained from the EPA's Integrated Risk Information System (IRIS) profiles and the EPA's 1991 Health Effects Assessment Summary Table (HEAST). The toxicity value for Chromium III was considered to be representative of total chromium exposure since most of the chromium in on-site soils is in the trivalent state (Chromium III), as indicated in Table V-1, although TCLP analyses indicated that most of the chromium that can be leached from the chrome-bearing bricks is in the hexavalent state. Total contaminant concentrations rather than TCLP concentrations are the principal concern in risk assessment.

Risk Characterization

Excess lifetime cancer risks are determined by multiplying the intake level with the CPF. These risks are probabilities that are generally expressed in scientific notation (e.g., 1x10[-6] or 1E-6). An excess lifetime cancer risk of 1x10[-6] indicates that, as a plausible upper bound, an individual has a one in a million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site.

Potential concern for non-carcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ), which is the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's RfD. By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

Risk evaluations for arsenic, cadmium, total chromium, hexavalent chromium and molybdenum were conducted and the results are summarized in Table VI-6. Chronic risk evaluations conducted for non-carcinogenic effects of arsenic, cadmium, chromium and molybdenum for future residents of the Site are less than one for all pathways, indicating that non-carcinogenic adverse health effects are unlikely to occur. Exposures to cadmium, chromium (total), hexavalent chromium and molybdenum were evaluated. Ingestion of contaminated produce and dust represent the greatest non-carcinogenic health hazard with a combined hazard index value of 0.58. Molybdenum presents the greatest chronic health risk with a hazard risk index value of 0.43.

Ingestion of produce and dust results in the greatest amount of cancer risk, with cancer risks approximating 1 x 10[-5] for each pathway. The cancer risk resulting from ingestion of soil is 3 x 10[-7]. Cancer risks for ingestion of contaminated media were evaluated for arsenic only as oral cancer slope factors are not available for cadmium and hexavalent chromium. Inhalation of dust results in a cancer risk of approximately 2 x 10[-7] and these risks are attributable to the presence of arsenic, cadmium and hexavalent chromium. The total cancer risk for all four pathways is approximately 2 x 10[5].

A summary of risks due to lead exposure is presented in Table VI-7. The evaluation of lead risks involved using the IU/BK model to establish daily intake levels of lead and to estimate the distribution of bloodlead levels for two-year old children. Based on the results of the model, two significant exposure pathways were identified: ingestion of lead in soil and indoor dust and ingestion of contaminated produce. The mean blood-lead levels estimated for these two exposure pathways were 4.88 ug/dL and 6.55 ug/dL, respectively. To ensure that lead exposure will not be detrimental to children, no more than 5 percent of the predicted blood-lead levels can exceed 10 ug/dL. According to the IU/BK model results, exposure to soil and dust alone would result in 2 percent of exposed children having a blood-lead level exceeding 10 ug/dL. However, 11.4 percent of exposed 2 year old children would have blood-lead levels exceeding 10 ug/dL due to exposure to contaminated soil, dust, and produce. Therefore, under a future residential development scenario, exposures resulting from ingestion of lead-contaminated soil, dust and produce are unacceptable.

Finally, highly alkaline soils represent a potential source of future health risks. Health risks could include dermatitis, skin irritation, andpossible eye damage.

Action Levels

Concentrations that would be protective of human health and the environment were determined as part of the FFS and BRA. A soil action level for lead, which was based on acceptable blood lead levels in children, was determined to be 500 mg/kg in Site soils. In addition, since arsenic could not be excluded as a potential chemical of concern, a soil action level of 70 mg/kg for arsenic was determined. Although an action level for alkalinity was not quantified, it was determined that exposure to highly alkaline soil should be prevented.

Uncertainty Analysis

The risk evaluations for the Site are subject to an indeterminate amount of uncertainty. Major areas of uncertainty include: sampling and analytical results, toxicological data, estimation of exposure point concentrations and exposure parameters used to characterize frequency, duration and mode of exposure. Additionally, the level of exposure depends on the future use of the Site, which may or may not be residential.

Summary of Human Health Risks

The unacceptable primary health hazards associated with the Site are due to the presence of lead and potentially arsenic in soils as well as the alkalinity of the soil. Additionally, the chrome-bearing bricks present a potential risk. Health risks associated with the remaining contaminants of potential concern were found to be within acceptable limits. The calculated potential cancer risk falls within EPA acceptable risk range of 1 x 10[-4] to 1 x 10[-6]. This cancer risk is likely to be an overestimate due to the conservative assumptions used to calculate exposure levels and risks. Non-carcinogenic adverse health effects are not likely to occur as a result of residential exposures to contaminated soils at the Site.

ENVIRONMENTAL RISKS

Environmental risks are often difficult to quantify. No attempt was made at such quantification in the BRA. Environmental risks were qualitatively evaluated under OU1 and it is assumed that the same issues will be a concern for OU2 after implementation of the OU1 remedy. These issues are summarized below:

First, contamination on the Site has severely altered the vegetation and the transport of contaminated dust and soil off site has the potential to adversely impact vegetation in neighboring areas. Most of the impact on vegetation may be due to high alkalinity.

Second, ponded water on the Site may cause burns to terrestrial wildlife, including numerous avian species which might use the nearby Surplus Canal as a nesting and feeding area.

Third, the molybdenum present in the soil on the Site has the potential for causing adverse effects to any livestock in the immediate area.

Finally, fish in the Jordan River and Surplus Canal could be adversely effected by caustic run-off from the Site. Although such effects were not evident during site characterization work, they could occur in the future. No listed or candidate threatened or endangered species are known to occur in the vicinity of the Site.

VII. Description of Alternatives

An FFS was conducted to develop and evaluate remedial alternatives for OU2. Remedial alternatives were assembled from applicable remedial technology process options and were initially evaluated for effectiveness, implementability, and cost. The alternatives meeting these criteria were then evaluated and compared to nine criteria as required by the National Oil and HazardousSubstances Pollution Contingency Plan (NCP). In addition to the remedial alternatives, the NCP requires that a no-action alternative be considered at every site. The no-action alternative serves primarily as a point of comparison for other alternatives.

The development of alternatives was based on the following remedial action objectives:

. to eliminate risks associated with exposure to soils with elevated levels of lead, arsenic and alkalinity;

. to eliminate exposure to chromium and to meet the ARARs associated with storage, treatment and disposal of the chromebearing bricks, which are a characteristic hazardous waste;

. to minimize restrictions on future Site use;

. to reduce exposure to potential windblown contaminants; and

. to eliminate a potential source of groundwater contamination.

Quantities of soil which were considered in the alternatives analysis were calculated using risk-based action levels which were developed to meet the remedial action objectives. These action levels are 500 mg/kg for lead and 70 mg/kg for arsenic. Treatment levels described under each alternative are based on ARARs.

To eliminate the potential risk from exposure to lead in Site soils and highly alkaline soils and to meet ARARs associated with the chrome-bearing bricks, several remediation technologies were evaluated, including: containment; treatment via chemical fixation, chemical precipitation and solidification; and disposal. Some of these technologies were combined to develop the following site-specific remediation alternatives:

. No Action;

ù Limited Action involving on-site treatment and offsite/on-site disposal of chrome-bearing bricks along with placement of a soil cover and institutional controls;

. On-Site Treatment and Off-Site Disposal of contaminated soils above action levels and chrome-bearing bricks, with placement of a soil cover; and

. On-Site Treatment and On-Site Disposal of contaminated soils above action levels and chrome-bearing bricks.

No Action Alternative

The No Action Alternative, which must be considered according to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the NCP, would involve no additional remedial action beyond that which is planned during the cleanup of OU1. The selected remedy for OU1 includes removal of some contaminated soil and co-disposed materials, although the quantities are not certain. The chrome-bearing bricks would be left on site. Based on data from the sampling of OU2 soils, it may not be possible to dispose of some of the contaminated soils without prior treatment due to the LDRs promulgated under RCRA. There is currently a chain-link fence around the Site to limit access to the Site. The fence would probably be left in place during and after remediation of OU1. Finally, the selected remedy for OU1 provides for initiation of groundwater monitoring.

However, even with these limited actions in place after completion of the remedy for OU1, the future risks described in the BRA for OU2 under a residential development scenario will not be mitigated or eliminated. There are no costs associated with the No Action Alternative. If the No Action Alternative is implemented, Applicable or Relevant and Appropriate Requirements (ARARs), as identified in Exhibit 1, would not be met.

Limited Action

The Limited Action Alternative includes minimal remedial action required to meet ARARs and decrease Site risks. The Limited Action Alternative includes on-site treatment of approximately 360 tons of chrome-bearing bricks by chemical fixation/solidification, with subsequent off-site disposal. Chromium levels would be reduced to less than 5 mg/L, as measured by TCLP analysis. The FFS indicated that this treatment level could be met using these technologies. At this treatment level, the treated bricks would not be considered a hazardous waste and could be land-disposed in a solid waste disposal facility. However, if the chromium level in the chrome-bearing bricks cannot be reduced to less than 5 mg/L, the treated bricks would still be classified as a D007 hazardous waste. The Land Disposal Restrictions (LDRs), as promulgated under RCRA, prohibit land disposal of D007 hazardous waste unless it is treated so its chromium concentration is 5 mg/L or less, as measured by TCLP analysis.

The Limited Action Alternative also includes construction of a protective cover approximately 18 inches thick of clean fill over the entire Site and the backfilling of any excavation scars remaining from OU1 remediation to mitigate risks from exposure to lead-contaminated and highly alkaline soils and windblown dust. The soil cover would also allow minimal revegetation of the Site and minimize physical hazards on the Site. Finally, institutional controls would be implemented to ensure that future construction activities are protective of human health, maintain the soil cover and do not result in off-site transport of contaminated materials above health-based levels.

Under this alternative, all of the exposure pathways identified in the BRA would be addressed. This alternative would be cost-effective but would require long-term monitoring to ensure the remedy continues to provide adequate protection. Additionally, this alternative requires issuance andenforcement of strict zoning and deed restrictions by the local government. Agreement regarding the placing and enforcement of restrictions would need to be obtained to ensure the protectiveness of the remedy. Furthermore, this alternative would not eliminate the potential source of groundwater contamination. As part of the FFS, the total present value cost associated with this alternative was estimated to be approximately $2.93

million. This cost includes operations and maintenance costs of approximately $113,000 over a period of 30 years and a discount rate of 10 percent. The FFS estimated that it would take less than one year to implement this alternative.

On-Site Treatment and Off-Site Disposal of Contaminated Soil and Chrome-Bearing Bricks

This alternative provides permanent treatment of all surficial soils with contaminant levels greater than 500 mg/kg lead or 70 mg/kg arsenic. The exact volume of contaminated soils requiring treatment would be identified during the design and implementation of the remedy. During the FFS, the volume of contaminated soil and chrome-bearing bricks to be processed were estimated to be approximately 27,000 cubic yards and 360 tons, respectively.

Treatment of the soils would be accomplished by solidification, and the chrome-bearing bricks would be treated using chemical fixation followed by solidification. All treatment would occur on site. The FFS indicated that currently established treatment levels for chromium and lead of 5 mg/L, as measured by TCLP analysis, could be met using these techniques. By reducing lead and chromium levels to less than 5 mg/L, the treated soil and chrome-bearing bricks would no longer be considered hazardous wastes and could be land-disposed off site in a solid waste disposal facility.

Following removal of the contaminated soil, a protective cover consisting of approximately 18 inches of clean backfill would be installed, as described under the Limited Action Alternative. The actual thickness of the cover may need to be greater depending upon the depth of excavation and to prevent low areas from filling with ponded water.

This alternative will comply with identified ARARs, which include LDRs. Institutional controls, if required, would be much less stringent and lengthy than for the Limited Action Alternative, since soils above acceptable lead and arsenic levels would be removed. The remedial action can be designed to enhance equalization of the remaining highly alkaline soil. This would also lessen the need for institutional controls. The type of and period of time during which institutional controls would need to remain in place would be determined during remedial design. This alternative would also lessen the potential release of any additional contaminants to groundwater.

The costs associated with this alternative were estimated during the FFS to be approximately $6.4 million present value. This does not include operations and maintenance costs, as they were assumed to be negligible.

The FFS predicted that implementation of this alternative would take less than one year and could be accommodated within the OU1 remediation schedule to take advantage of the equipment mobilization already planned for the Site.

On-Site Treatment and On-Site Disposal of Contaminated Soil and Chrome-Bearing Bricks

This alternative provides permanent treatment of all surficial soils with greater than 500 mg/kg lead or 70 mg/kg arsenic, as well as treatment and on-site disposal of all chrome-bearing bricks. As with the previous alternative, the exact volume of contaminated soils requiring treatment would be identified during the design and implementation of the remedy. The volumes of contaminated soil and chrome-bearing bricks that need to be processed were estimated during the FFS to be approximately 27,000 cubic yards and360 tons, respectively.

Treatment of soils would be accomplished by solidification and treatment of chrome-bearing bricks would be by chemical fixation followed by solidification. All treatment would occur on site. Following removal of the contaminated soil, a protective cover approximately 18 inches of clean backfill would be constructed, as described under the Limited Action Alternative. The actual thickness of the cover may need to be greater depending upon the depth of excavation and to prevent low areas from filling with ponded water.

The treated material would be placed on-site in a location and form to be determined during remedial design. Institutional controls, if required, would be less stringent than for the Limited Action Alternative since all human exposure pathways would be addressed. Deed restrictions may be necessary to prevent the treated material and the protective soil cover from being disturbed. The potential source of groundwater contamination would be addressed.

Capital costs for this alternative were estimated during the FFS to be approximately $5.6 million present value. Operations and maintenance costs were assumed to be negligible.

This alternative would comply with identified ARARs, including LDRs. The soil and chrome-bearing bricks would be treated to a lead and chromium levels of less than 5 mg/L, respectively, as measured by TCLP analysis.

In the FFS, it was estimated that this alternative could be implemented in less than one year and could be accommodated within the OU1 remediation schedule.

Table VII-1 summarizes the remedial alternatives. For the purposes of evaluating the remedial alternatives, volumes and quantities calculated during previous investigations were utilized. It was assumed that a total of 27,000 cubic yards of soil contains greater than 500 mg/kg lead or 70mg/kg arsenic; therefore, this amount will require treatment prior to disposal. Additionally, 360 tons of chrome-bearing bricks will need to be treated prior to disposal to comply with LDRs, and 170,400 cubic yards of soil will be required for an 18-inch thick protective soil cover.

VIII. Summary of Comparative Analysis of Alternatives

The four remedial alternatives developed in the FFS were analyzed in detail using nine criteria: 1) overall protection of human health and the environment, 2) compliance with ARARs, 3) long-term effectiveness and permanence, 4) reduction of toxicity, mobility or volume through treatment, 5) short-term effectiveness, 6) implementability, 7) cost, 8) state acceptance, and 9) community acceptance. The evaluation of each criterion for the four alternatives is presented below. Table VIII-2 summarizes the comparative analysis of alternatives that was conducted as part of the FFS.

Protectiveness of Human Health and the Environment

The On-Site Treatment and Off-Site Disposal Alternative assures the greatest protectiveness since disposal will occur in a controlled environment such as a landfill and also employs treatment to eliminate the principal threats associated with the contaminated soil and chrome-bearing bricks and to stabilize hazardous levels of lead and arsenic from the contaminated soil and chromium from the chrome-bearing bricks. Remaining Site soils would have a lead concentration of 500 mg/kg or less and an arsenic concentration of 70 mg/kg or less. Treated soil and chrome-bearing bricks would have lead and chromium levels of less than 5 mg/L as measured by TCLP analysis.

The On-Site Treatment and On-Site Disposal Alternative is less protective than the alternative utilizing off-site disposal since disposal would not occur in a controlled environment. However, this alternative is stillsomewhat protective because, similar to the Off-Site Disposal Alternative, it employs treatment of contaminated soil and chrome-bearing bricks.

The soil cover would eliminate the risk of direct exposure to highly alkaline soils and would also mitigate the potential risk from ingesting produce grown in soil contaminated with lead and arsenic. These two alternatives also eliminate a potential source of groundwater contamination. However, some restrictions may be needed for the On-Site Disposal Alternative to assure that the protective soil cover and treated soil are not disturbed.

The Limited Action Alternative would provide a barrier for direct contact with highly alkaline soils and would eliminate the risks associated with the chrome-bearing bricks. However, the Limited Action Alternative, specifying no treatment of soils, would leave untreated contaminated soil above action levels. This alternative would require institutional controls to prevent exposure to the contaminants. Future construction activities on the Site would be subject to restrictions. Untreated soils may continue to leach high amounts of contaminants into groundwater.

The No Action Alternative does not adequately protect human health and the environment.

Compliance with ARARs

All but the No Action Alternative can meet all identified ARARs, as shown in Exhibit 1. These alternatives would comply with the LDRs, as appropriate.

The No Action Alternative does not address nor comply with ARARs associated with the storage, treatment, and disposal of chrome-bearing bricks.

Long-Term Effectiveness and Permanence

The On-Site Treatment and Off-Site Disposal Alternative would provide the greatest long-term effectiveness and permanence since it would permanently treat all contaminated soils that are above health-based action levels for which an existing exposure pathway is present and allow for the disposal of the treated material in the controlled environment of a solid waste landfill. In a landfill, release to the environment is prevented in the occurrence of a breakdown of the treatment. The On-Site Treatment and On-Site Disposal Alternative would provide less long-term effectiveness and permanence since disposal would be in a less controlled environment and will rely on institutional controls to maintain effectiveness of the remedy. These two alternatives would provide greater long-term effectiveness and permanence than the Limited Action Alternative in which contaminated soils above action levels would remain on site.

The protective soil cover placed over the contaminated soil in the Limited Action Alternative would provide a relatively high level of longterm effectiveness, but would require long-term maintenance and institutional controls.

The No Action Alternative would not address the contaminated soils nor the chrome-bearing bricks on the Site. Soil contaminants would continue to be able to migrate to the air, surface water, and groundwater, and would remain a threat to human health and the environment. Potential exposure to the chrome-bearing bricks would still exist and ARARs associated with hazardous waste storage and disposal would not be met.

Reduction of Toxicity, Mobility, or Volume Through Treatment

All but the No Action Alternative would provide permanent reduction in toxicity and mobility of the chromium in the chrome-bearing bricks through chemical transformation of the chromium and solidification of the crushed brick material. The treatment of the contaminated soils in the two soil treatment alternatives will permanently reduce the toxicity and mobility of the lead and arsenic in the soils. The Limited Action Alternative would not reduce thetoxicity or mobility of the contaminated soils.

The No Action Alternative would not reduce the toxicity, mobility, or volume of contaminants in the contaminated soil nor in the chrome-bearing brick.

Short-Term Effectiveness

All but the No Action Alternative involve the on-site crushing of chrome-bearing brick prior to treatment. This activity may generate dust, which may be reduced by using engineered controls. Workers would be required to wear appropriate protective equipment. There would be an increase in the probability of traffic-related accidents associated with transport of backfill to the Site, but these impacts could be minimized through implementation of appropriate transportation safety measures. For the two contaminated soil treatment alternatives, dust generation during excavation and treatment of contaminated soils could increase risks. Therefore, dust suppression measures, air monitoring, and appropriate personal protective equipment for onsite personnel would be included to mitigate potential impacts to on-site workers and surrounding populations. All alternatives except the No Action Alternative would take less than one year to implement. The probability of traffic-related accidents would also increase with the On -Site Treatment and OffSite Disposal Alternative, but those impacts could be minimized through implementation of appropriate transportation safety measures.

Under the No Action Alternative, no dust suppression methods would be employed following completion of remedial action for OU1. Potential hazards associated with windblown dust and airborne contaminants from the Site may be expected when surface soils dry following remediation of OU1. Risk associated with on-site contaminants would remain.

Implementability

All of the alternatives can be implemented with varying degrees of difficulty and within a similar time period of less than one year. The equipment for treating the contaminated soils and chrome-bearing bricks is readily available from several vendors and treatment technology is well demonstrated for the Site soils and the contaminant levels present at the Site. Bench-scale or pilot tests to determine relative quantities of the treatment ingredients will likely be conducted during the remedial design phase. The soil treatment process could be accommodated within the OU1 remediation schedule for use of equipment already planned for the Site. Preliminary treatability studies and previous experience indicate that solidification of the brick and chemical transformation of the chromium would be implementable. Equipment for crushing the bricks is available from several vendors. Importation and installation of a clean backfill cover under all but the No Action Alternative are easily implementable using readily available earth moving equipment. Institutional controls such as deed restrictions, which are required by the Limited Action and On-Site Disposal Alternatives, may be implemented, but will require the cooperation of the local government. Presently there is sufficient capacity at existing off-site solid waste landfills to accommodate the anticipated amounts of treated and solidified soil and bricks.

Cost

As developed in the FFS, Table VIII-1 lists the estimated costs for each evaluated alternative in order of increasing total cost. Capital costs include the expense of: mobilization/demobilization, treatment, sampling and analysis, disposal and reclamation. Operations and maintenance costs include major institutional controls and long-term monitoring and have been calculated for a period of 30 years at a 10 percent discount rate. Costs are in thousands of dollars.

State Acceptance

The State conducted the RI/FFS for OU2 and issued the Proposed Plan. In the Proposed Plan, the State identified On-Site treatment and On-Site Disposal as the preferred alternative. Due to the public comment received and concerns with maintaining the effectiveness of the treated material on site, the State now considers the On-Site Treatment and Off-Site Disposal Alternative as the best alternative.

Community Acceptance

The majority of comments received were in opposition to the No Action and Limited Action Alternatives. Several comments supported the preferred alternative stated in the Proposed Plan, which was On-Site Treatment and On-Site Disposal. Most area residents, business owners, and Site land owners felt the reliance on institutional controls was not adequate and were concerned that the development of the land would be limited by on-site disposal. In the same comments, concern was also voiced regarding depreciated property values. Many comments questioned the permanence of the solidification and expressed concern about monitoring the material for the continued effectiveness of the treatment. The majority of comments stated a preference for off-site disposal of the treated material in a controlled landfill environment.

All local officials wanted the contaminated soils and chromebearing bricks treated and most wanted the treated material disposed of off site. The Salt Lake City and County Health Department suggested the material should be removed to a hazardous waste facility for treatment and disposal.

IX. Documentation of Significant Changes

The preferred alternative identified in the Proposed Plan was OnSite Treatment with On-Site Disposal. Under this alternative, the treated material would be left on site in an uncontrolled environment. The Proposed Plan preferred alternative relied on institutional controls to maintain the effectiveness of the treatment. The treated material would be subject to changing environmental conditions on the Site. The selected remedy, On-Site Treatment and Off-Site Disposal, provides greater permanence and assured effectiveness than the on-site disposal conditions previously described. Additionally, the cost difference between the on-site and off-site disposal of the treated material is relatively small. These factors, which were brought out during the public comment period, influenced the decision to choose on-site treatment with off-site disposal as the selected remedy over the proposed plan preferred alternative.

The Proposed Plan also discussed the possible use of a treatability variance to modify treatment levels required for land disposal. Further review of

EPA guidance regarding treatability variances indicates that the variance is not applicable to the types of hazardous waste present at the Site.

As a result of public comments, the use of institutional controls is more thoroughly explained in the Description of Alternatives and Selected Remedy sections of this ROD. Additionally, limiting controls restricting use of the Site was added to the remedial action objectives. For the Proposed Plan preferred alternative, institutional controls would be needed to assure the treated material disposed of on site is not disturbed, thereby changing the treatment effectiveness. Institutional controls would also be necessary to prevent exposure to the remaining highly alkaline soils remaining on site. The selected remedy only requires institutional controls to prevent exposure to the remaining highly alkaline soils. The protective soil cover could be designed to limit the necessity for and/or duration of institutional controls. The length of institutional controls that are needed will be determined during the remedial design. However, the required controls are anticipated to be minimal compared to those required by the other remedial alternatives.

X. The Selected Remedy

Based upon consideration of the requirements of CERCLA, the detailed analysis of alternatives and public comments, both the EPA and the State of Utah have determined that On-Site Treatment and Off-Site Disposal is the most effective remedy for OU2 at the Site.

The On-Site Treatment and Off-Site Disposal Alternative requires:

- soil above 500 mg/kg lead and/or 70 mg/kg arsenic shall be excavated;

- soil equal to or above 5 mg/L, as measured by TCLP analysis, shall be identified and treated by solidification; during the RI/FFS, it was determined that soil above 500 mg/kg lead will likely be above 5 mg/L lead as measured by TCLP analysis;

- the chrome-bearing bricks shall be treated by chemical fixation followed by solidification;

- all excavated and treated material shall be transported off site to an appropriate disposal facility; and

- a protective cover of clean fill at least 18 inches thick shall be installed over the Site.

Institutional controls, if needed, will likely be imposed during or after design and implementation of the remedy. The length of time during which controls are needed will be determined during remedial design.

Remedial Action Objectives

The conditions that will exist at the Site after the implementation of the OU1 remedy will potentially present unacceptable risk from lead and potentially arsenic through soil, dust and crop ingestion. The potential of skin burns or eye damage from the highly alkaline soils will present an acuterisk. There will also be risks at the Site that are associated with the chromebearing bricks. Additionally, treatment of the bricks is necessary to meet ARARs associated with storage, treatment and disposal of a hazardous waste.

The purposes of this remedial action are:

- to eliminate risks associated with exposure to soils with elevated levels of lead, arsenic and alkalinity;

- to eliminate exposure to chromium and to meet the ARARs associated with storage, treatment and disposal of the chromebearing bricks, which are a characteristic hazardous waste;

- to minimize restrictions on future use of the Site;

- to reduce exposure to potential windblown contaminants; and

- to eliminate potential sources of groundwater contamination.

Remediation Goals/Action Levels

The action level for lead in soil is based upon an acceptable blood-lead level in children exposed to the soil through ingestion and has been rounded to 500 mg/kg. The rounded action level will provide an easy analytical determination of when sufficient removal of soil has occurred. At this concentration, a significant number of children should not have a blood-lead level above the acceptable level of 10 ug/dL.

An action level for arsenic of 70 mg/kg is also provided. Although arsenic levels above 70 mg/kg were not detected on site, the action level is provided because arsenic could not be ruled out by statistical analysis as a contaminant of concern. At this arsenic concentration, there is a 2 x 10[-5] risk of cancer for the ingestion of soil and a 5 x 10[-5] risk of cancer through ingestion of produce grown in Site soil.

Since an action level for alkalinity was not determined, the selected remedy does not require removal of soil exceeding a specific pH or alkalinity. However, the clean layer of fill placed as part of the selected remedy shall provide protection from exposure to the highly alkaline soils remaining on site. The fill layer, as designed, should enhance remaining soil pH equalization to levels near background and limit the restrictions on future use of the Site.

Institutional Controls

Institutional controls necessary to protect exposure to the remaining highly alkaline soils will be determined during or after the design and implementation of the remedy. The time period during which controls that are needed shall be part of the determination. Methods for limiting the number and type of conditions or length of time needed shall also be considered in the remedial design. The controls shall remain necessary as long as there is potential for exposure to highly alkaline soils. Additionally, the controls needed under OU2 shall consider actions taken under other OUs on the Site.

Treatment Levels

Treatment levels for soil are dictated by LDRs. These restrictions require all hazardous wastes to have a lead level of 5 mg/L or less, as measured by TCLP analysis, before land disposal can occur. The 5 mg/L lead concentration, as measured by TCLP analysis, is also used to determine if a solid waste is a D008 characteristic hazardous waste. Solid waste with lead TCLP levels equal to or greater than 5 mg/L are defined as characteristic hazardous wastes with the waste code designation D008. Soils above this level were found on site. Thus, all soil above this level will be treated to below the 5 mg/L lead level, as measured by TCLP analysis so it will no longer be classified as a hazardous waste and can be managed as a solid waste.

Treatment levels for the chrome-bearing bricks are also dictated byLDRs. The chrome-bearing bricks are a characteristic hazardous waste for chromium, with a waste code of D007. The chrome-bearing bricks must be treated to a chromium level, as measured by TCLP analysis, below 5 mg/L prior to land disposal. When the chrome-bearing bricks are treated to below this level, they will no longer be considered a hazardous waste and can be managed as a solid waste.

Volumes and Cost

The estimated volumes and cost associated with implementation of the selected remedy are presented in Table X-1. The costs associated with Item 5 are based on figures supplied in the original FS conducted by Lone Star and have been updated to 1991 dollars at a 7 percent interest rate.

XI. Statutory Determinations

EPA's primary responsibility at Superfund sites is to select remedial actions that are protective of human health and the environment. CERCLA also requires that the selected remedial action for the Site comply with applicable or relevant and appropriate environmental standards established under Federal and State environmental laws, unless a waiver is granted. The selected remedy must also be cost-effective and utilize permanent treatment technologies or resource recovery technologies to the maximum extent practicable. The statute also contains a preference for remedies that include treatment as a principal element. The following sections discuss how the selected remedy for OU2 meets these statutory requirements.

Protection of Human Health and the Environment

The selected remedy would remove two contaminant sources from an area of relatively high population that is subject to increased urbanization, thereby providing the maximum reduction of the risks of direct contact and exposure to blowing dust and removing a potential source of groundwater contamination. The contaminated soil and chrome-bearing bricks will be treated to eliminate or reduce associated health risks both on the Site and at the off-site disposal facility. The selected remedy is considered to be highly protective of human health and the environment. The implementation of the remedy will not pose unacceptable short-term risks. The selected remedy will enable the final remediation of the Site by removing potential sources of groundwater contamination.

Attainment of Applicable or Relevant and Appropriate Requirements (ARARs) of Environmental Laws

The primary requirements that are applicable or relevant and appropriate to the selected remedy are:

- Federal and State solid waste disposal regulations;
- Federal land disposal restrictions pertaining to storage of hazardous waste;
- Federal land disposal restrictions pertaining to the treatment of hazardous waste prior to land disposal; and
- Federal and state air regulations on total suspended particulates and fugitive dust control.

The selected remedy will meet all ARARs. A summary of ARARs and guidelines to be considered (TBCs) for the selected remedy is presented in Exhibit 1.

Cost-Effectiveness

CERCLA requires that the selected remedy afford overall effectiveness proportional to its costs. According to the estimates provided in the FFS, the cost of the selected remedy will be approximately $6.4 million. This cost is the highest of the four alternatives. However, there is no entirely objective method of assigning a value to overall effectiveness and it isdifficult to quantify costs associated with ineffectiveness. The selected remedy provides the greatest long-term effectiveness and overall protection of human health and the environment of all the alternatives evaluated. The additional cost over the On-Site Disposal Alternative assures that the remedy remains effective.

Utilization of Permanent Solutions and Alternative Treatment Technologies

The selected remedy utilizes permanent solutions to the maximum extent possible. The selected remedy reduces the toxicity and mobility of the chrome-bearing bricks and soil through treatment. The treatment renders the material a non-hazardous waste, which eliminates the requirement to manage and monitor the material according to the hazardous waste regulations. By requiring the off-site disposal in a controlled environment, such as a landfill, the selected remedy assures greater permanence than if on-site disposal occurred. Under on-site disposal the material would be left in an uncontrolled environment with little or no monitoring of the continued treatment effectiveness. The cost of attaining this assurance of treatment permanence and addressing the concerns of the public is relatively small. Finally, the selected remedy is easily implemented and could be accommodated within the OU1 remediation.

Preference for Treatment as a Principal Element

The selected remedy will utilize treatment as a principal element to address the principal threats at the Site. Contaminated soil and the chromebearing bricks will be treated using proven technologies to reduce hazardous levels of lead and chromium, respectively. Planned treatment levels of below 5 mg/L lead and chromium, as measured by TCLP analysis, will enable the treated material to be removed from classification as a hazardous waste and to be land disposed as a solid waste.

List of Acronyms

ARAR: Applicable or Relevant and Appropriate Requirement
BRA: Baseline Risk Assessment
CERCLA: Comprehensive Environmental Response, Compensation and Liability Act
CKD: Cement Kiln Dust
CPF: Cancer Potency Factor
EPA: U.S. Environmental Protection Agency
FFS: Focused Feasibility Study
HEAST: Health Effects Assessment Summary Table
HQ: Hazard Quotient
IRIS: Integrated Risk Information System
IU/BK: Integrated Uptake/Biokinetic (Model)
LDR: Land Disposal Restriction
m^3: cubic meter
MF: Modifying Factor
mg/L: milligrams per liter
NCP: National Oil and Hazardous Substances Pollution Contingency Plan
NPL: National Priorities List

OU: Operable Unit
PCU: Portland Cement Company of Utah
PRP: Potentially Responsible Party
RCRA: Resource Conservation and Recovery Act
RfD: Reference Dose
RI: Remedial Investigation
SARA: Superfund Amendments Reauthorization Act
SF: Slope Factor
TCLP: Toxicity Characteristic Leaching Procedure
UDEQ: Utah Department of Environmental Quality
UF: Uncertainty Factor
ug/dL: micrograms per deciliter (10[-6] grams per .10 liter)

Glossary

Action Levels: Levels of contamination in soil, air or water above which there is an unacceptable risk. Action levels vary from site to site and even within sites, based on potential exposure.

Administrative Record: A file which contains all information used by the lead agency to make its decision on the selection of a response action.

Alkalinity: A chemical property of certain substances which have a pH greater than 7.

Applicable or Relevant and Appropriate Requirements (ARARs): Refers to the federal and state requirements that a selected remedy is required to attain. They include requirements such as allowable air emission limits and allowable levels of contaminants in site soils and surface water.

Chemical Fixation: A chemical treatment process whereby chromium is made less toxic. The process occurs prior to the solidification of the crushed brick material.

Groundwater: Water contained in sand, soil, rock or gravel particles beneath the earth's surface. Rain that does not evaporate or immediately flow to rivers, streams and lakes seeps into the ground, forming a groundwater reservoir. Typically, groundwater flows more slowly than surface water and often discharges to streams, rivers and lakes.

Hazardous Waste: Under RCRA, a soil waste or combination of solid wastes which because of quantity, concentration or physical, chemical or infectious characteristics may pose a threat to human health or the environment.

Hazardous Substance: Under CERCLA, any element, compound, mixture, solution or substance which, when released to the environment, is found by the EPA to present substantial danger to public health, welfare or the environment.

pH: Used in expressing both acidity and alkalinity on a scale from 0 to 14, with 7 representing neutrality. Numbers less than 7 indicate increasing acidity and numbers greater than 7 indicate increasing alkalinity.

Institutional Controls: Controls, either legal or physical, which restrict individuals from coming into contact with contaminated portions of a Superfund site. These controls include fencing, warning signs and deed restrictions.

Mobility: The ability of a chemical to move through the environment.

National Priorities List (NPL): EPA's list of top priority hazardous waste sites that are eligible for investigation and cleanup under the federal

Superfund Program.

Plume: The body of groundwater which has detectable concentrations of contaminants and extends away from a source area of contamination, usually moving parallel to groundwater flow direction.

Potentially Responsible Party (PRP): An individual(s) or company(ies) potentially responsible for, or contributing to, the contamination problems at a Superfund site. Whenever possible, EPA requires PRPs, through administrative and legal actions, to clean up hazardous waste sites they have contaminated.

Record of Decision (ROD): A public document that records and explains the remedial alternatives to be used at a Superfund site. The ROD is based on information from the Remedial Investigation, Feasibility Study, Baseline Risk Assessment, public comments and community concerns.

Remedial Investigation/Feasibility Study (RI/FS): These are two separate but related studies. During the RI, the types, amounts and locations of contamination at a site are identified. In the FS, alternatives for cleaning up the contamination are identified, screened and compared. The FS for OU2 is called a focused FS because it is more narrow in scope and therefore few alternatives need to be considered.

Solidification: The on-site process whereby contaminated soil and crushed chrome-bearing bricks are made into solid, transportable units using cementing agents.

Toxicity: The degree to which a poison is toxic.

Treatment Level: The concentration of a contaminant to be achieved by treatment of air, soil, water or bricks.

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Exhibit 1: ARARs Evaluation

A list of ARARs was developed for the selected remedy for OU1 and can apply to remediation goals established at OU2. The ARARs which are relevant to the Site are listed below.

Chemical-Specific ARARs

40CFR 261 - Identification and Listing of Hazardous Waste:

- Defines solid wastes subject to regulation as hazardous waste.

40CFR 261.24 - Toxicity Characteristic:

- Describes use of the TCLP test method to determine if a solid waste is a hazardous waste by the characteristic of toxicity.

40CFR 268.2(g) - Definition of Inorganic Soil and Debris (includes chrome-bearing bricks).

40CFR 268.35 - Waste Specific Prohibition - Third Third Wastes:

- D008 will require treatment prior to land disposal effective August 8, 1990.

- Inorganic soil and debris will require treatment prior to land disposal effective May 8, 1992.

40CFR 268.41 - Treatment Standards Expressed as Concentrations in Waste Extract:

- The treatment standards for lead and total chromium are both 5.0 mg/l as measured in the TCLP extract.

Utah Clean Air Act (Utah Code Annotated, Title 26, Chapter 13):

- R-446-1-4.5 U.A.C. (Regulations governing fugitive dust emissions, including total suspended particulates (TSP) at construction sites).

- R-446-1-3.1.8 U.A.C. (Requires the use of Best Available Control Technology for any source of emissions).

40CFR 50 - National Primary and Secondary Ambient Air Quality Standards:

- Standards for ambient air quality to protect public health and welfare (including standards for particulate matter and lead).

40CFR 61 - National Emission Standards for Hazardous Pollutants:

- Emission standards for designated hazardous pollutants including inorganic arsenic from any stationary source.

R450-101 et seq. - Utah Corrective Action Cleanup Standards Policy (Applicable to RCRA, UST, and CERCLA Sites):

- Rules establishing policies of the Solid and Hazardous Waste Committee. Minimum standards for cleanup are MCLs, standards under Clean Air Act, and other standards as determined applicable. Cleanup standards evaluation criteria include numerical, technology-based, or risk-based standards or a combination.

Location-Specific ARARs

40CFR 6.301(c) - Archaeological and Historic Preservation Act:

ù Procedures to provide for preservation of historical and archaeological data which might be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity or program.

40CFR 6.301(b), 36CFR 800 - National Historic Preservation Act:

- Requires federal agencies to take into account the effect of any federally assisted undertaking or licensing on any district, site, building, structure, or object that is included in or eligible for Register of Historic Places.

40CFR 6.301(a) - Historic Sites, Buildings, and Antiquities Act:

- Requires federal agencies to consider the existence and location of landmarks on the National Registry of Natural Landmarks to avoid undesirable impacts upon such landmarks.

50CFR 17 and 402, 40CFR 6.302(h) - Endangered Species Act:

- Requires federal agencies to insure that any action authorized, funded, or carried out by the agency will not jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify critical habitat.

40CFR 6.302(g) - Fish and Wildlife Coordination Act:

- Requires consultation with the Fish and Wildlife Service when any federal department or agency proposes or authorizes any modification or control of any stream or other water body and requires adequate provision(s) for protection of fish and wildlife resources.

Executive Order No. 11,988, 40CFR 6.302(b) and Appendix A Executive Order on Floodplain Management:

- Requires federal agencies to evaluate the potential effects of actions they may take in a floodplain and to avoid, to the maximum extent possible, the adverse impacts associated with direct and indirect development of a floodplain.

Executive Order No. 11,990, 40CFR 6.302(a) and Appendix A Executive Order on Protection of Wetlands:

- Requires federal agencies to avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practicable alternative exists.

Action-Specific ARARs

29CFR 1910 and 1926 - OSHA Standards for Worker Health and Safety.

40CFR 265 Subpart Q - Chemical, Physical and Biological Treatment.

40CFR 268.50 - Prohibition on Storage of Restricted Wastes:

ù Requirements for accumulation of restricted wastes, relevant and appropriate to on-site staging, prior to remediation, of chrome-bearing bricks.

40CFR 107 and 171-177 - DOT Regulations for Transport of Hazardous Waste.

40CFR 262 - Standards for Hazardous Waste Generators.

40CFR 263-Standards Established by EPA/DOT for Transporters of Hazardous Waste Per Manifest Requirements.

40CFR 270 - Hazardous Waste Permit Program.

To Be Considered Regulations

Salt Lake City Corporation (Salt Lake City Zoning Ordinance, Section 21.66.010 (33) and Section 21.66.040 (A).

. This ordinance regulates land use. The Site is zoned M-1 and C-2.

Salt Lake City/County Health Department - Health Regulations No. 1, Solid Waste Management Facilities. Utah Code Ann., Section 26-24-20.

Salt Lake City Ordinance. Wastewater Control Ordinance/Rules and Regulations. Title 37 Revised Ordinances of Salt Lake City.

. Regulations for direct and indirect contributors to the publicly-owned treatment works (POTW) wastewater system permit issuance and general requirements. Federal pre-treatment standards applicable and numerical pollutant limitations specified in this ordinance for heavy metals.

40CFR 268.44 - Variance From a Treatment Standard, According to: "Obtaining a Soil and Debris Treatability Variance for Remedial Actions", September 1990.

. Alternate treatability variance levels and technologies are provided for chromium and lead in water. For concentrations in the TCLP extract less than 120 mg/l for chromium, the acceptable TCLP concentration range for the treated waste is 0.5 to 6.0 mg/l. For lead in the TCLP extract less than 300 mg/l, the acceptable TCLP concentration range for the treated waste is 0.1 to 3.0 mg/l.